Lec 1

* Why image Processing?

→ improve Pictorial informations for human interperetation.

→ Processing image for:

- storage.
- transmission.
- Representation for autonomous machine.

* Image Processing
  - input : image
  - output : image (improved)

* Computer vision:
  - input : image
  - output : interpretation for image objects.

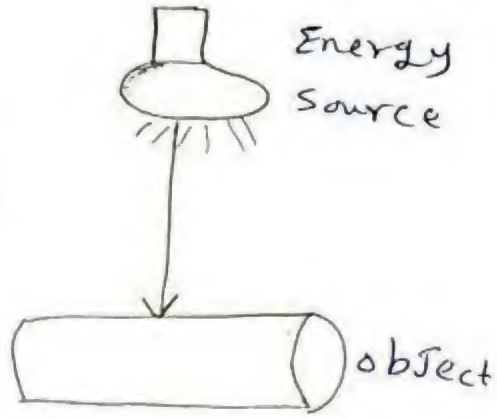
Digital image:
- matrix of pixels $f(x,y)$ where f is the intensity of pixels.

sources of images:-

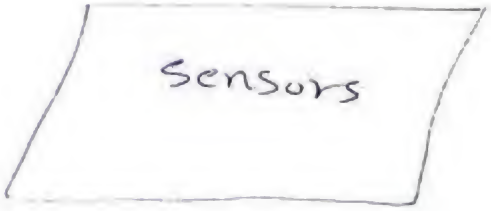
a) Electromagnetic waves.
b) Electronic microscope.
c) sound waves
d) Computer graphic.

- e) next Page.

How image is generated (~~image~~



↳ object can reflect energy or it can pass through the object then captured by the sensor to generate the image



* Electromagnetic waves

↳ stream of mass less particles called photons that move with speed of light and have a certain amount of energy.

* Gamma - Rays. * X - Rays. * ultra violet.
* visible.
* Infro - red. * micro waves. * Radio waves.

Image - Processing and other areas.

a) Low level :.

↳ output is improved image.

EX: improve contrast, reduce noise.

b) Mid-level

↳ output is extracting features from the image.

Ex: extract characters from image.

c) High-level

↳ output: is an interpretation of the image.

Ex: interpreting characters in the image.

Applications

* Gamma-ray:

→ bone scane. →radiations from reactor valve.

→ PET Postpone emition temography.

* X-Ray

→ CAT Computerize Axial temography to form. (3D image)

→ checking circuit board for missing parts.

→ Aortic angiogram (image of blood vessels using cathcter) أشعة الوريد

* Ultraviolet

↳ detect sick corn

* Visible

↳ light microscope.

* Visible / infrared

→ remote sensing. → whether forcasting & observation.
→ detect bubbles in plastic.
→ detect un-filled ~~bottels~~ bottle in Production line.

* Micro-waves → radar

* Radio-waves
  → MRI Magnetic reasonance imaging.

* Sound waves - Geological exploration
→ using plate of steal.
→ making it vibrate using sound waves.
→ sensing the reflecting sound.
→ forming image based on distance and speed of sound and strength.

* Sonar
  → using probe consisting of source and sensors for ultrasound wave.

Note

slide 23, 30 → check